Title: **WALL-MOUNTED ELECTRICAL DEVICE HAVING ADJUSTABLE OUTLET PRONGS**

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Cross-Reference to Related Applications

[0001] This application claims priority to United States Provisional Patent Application Serial No. 60/407,387 entitled "Wall-Mounted Electrical Device Having Adjustable Outlet Prongs," filed August 30, 2002, and is incorporated herein by reference.

Field of Invention

[0002] This invention generally relates to devices which mount to electrical receptacles, and more particularly, to devices capable of adapting to variously sized and/or shaped receptacles.

Background of the Invention

[0003] More recently, fragrance dispensers have become increasingly sleek in design for improved stability and appearance. Such new fragrance dispensers may also include two sets of outlet prongs that can be inserted into both outlets of a conventional duplex (i.e. dual-outlet) receptacle for improved stability.

[0004] Similarly, many other devices may interface with one or both outlets of duplex (or four-plex, six-plex, etc.) receptacles, such as battery chargers, timers, audio/visual devices, nightlights, wireless control devices, air filters, computing devices and the like.

[0005] As will be discussed in greater detail hereinbelow, the present invention is particularly suited for use with devices configured for interfacing with (or "plugging into") both outlets in a conventional duplex wall receptacle.

[0006] Various types of conventional outlet receptacles have been used for many years. Typical receptacles include two or more electrical outlets within a housing that is generally covered with a faceplate. The faceplate may also cover a switch, dimmer or other electrical control as well. A standard duplex receptacle is shown in Figure 1A. In recent years, many receptacles (such as those used in bathrooms and garages) incorporate ground fault circuit interrupters (GFCI or GFI) that break electrical continuity for the receptacle if a short or other unsafe condition occurs. GFCI receptacles typically include "TEST" and/or "RESET" buttons that can be manipulated to test the GFCI circuitry as appropriate. A conventional duplex GFCI receptacle is shown in Figure 1B. Both standard and GFCI receptacles are readily available from the Leviton corporation of Little Neck, New York, as well as from numerous other sources. Likewise, in various other circumstances, receptacles may be "non-standard" (e.g., outlets in older homes, different countries, etc.)

[0007] The physical and electrical specifications of electrical receptacles are set forth in various standards published by the Underwriters Laboratory (U.L.) of Northbrook, Illinois and by the Institute of Electrical and Electronic Engineers (IEEE), as well as in various municipal building codes. Although both GFCI and non-GFCI outlets are commonly found in most homes and businesses, the two types of outlets generally have slightly different physical dimensions. For example, the two outlets of a standard duplex outlet are approximately 1.5 inches apart, whereas the two outlets of a GFCI duplex outlet are approximately 1.675 inches apart. Although this difference appears to the casual observer to be relatively small, the difference is large enough to affect devices that are intended to interface with both outlets in the duplex receptacle. If the outlet prongs of the

device are rigidly fixed for standard duplex outlets, for example, the prongs may be difficult to insert into a GFCI outlet. Similarly, minor variations in receptacle standards for various countries, manufacturers or locales may affect the ease-of-insertion of certain fragrance dispensers and other dual-plug devices.

[0008] Accordingly, it is desirable to create a device that adapts to interface with variously sized receptacles, such as, for example, both standard and GFCI outlet receptacles of varying sizes and dimensions.

Summary of the Invention

[0009] In accordance with various exemplary embodiments of the present invention, an electrical device includes at least one set of prongs that are adaptable such that they may be readily inserted into receptacles of varying sizes. Adaptability may be provided through, for example, a movable connection between the prongs and one or more of the outlet plugs. According to one embodiment, an electrical device for interfacing with a duplex electrical receptacle suitably includes a housing, a first plug disposed within the housing and having a first set of prongs configured to interface with the first outlet of the receptacle, and a second plug disposed within the housing and having a second set of prongs configured to interface with the second outlet of the receptacle, wherein the second set of prongs is moveably coupled with respect to the housing to accommodate variations in distance between the first outlet and the second outlet. These and other aspects of the invention shall become more apparent when read in conjunction with the accompanying drawing figures and the attached detailed description of exemplary embodiments.

Brief Description of the Drawing Figures

[0010] The features and advantages of the present invention are hereinafter described in the following detailed description of exemplary embodiments to be read in conjunction with the accompanying drawing figures, wherein like reference numerals are used to identify the same or similar parts in the similar views, and:

[0011] Figures 1A and 1B are front views of exemplary standard and GFCI duplex receptacles;

[0012] Figure 2 is a perspective view of an exemplary device having adjustable outlet prongs;

[0013] Figure 3A is a cutaway side view of an exemplary device having a rotatable outlet prong;

[0014] Figure 3B is a cutaway side view of an exemplary device having a translatable outlet prong;

[0015] Figures 3C-D are side and top views, respectively, of an exemplary outlet prong; and

[0016] Figures 4A-B are cross-sectional views of an exemplary vapor dispensing device.

Detailed Description of Exemplary Embodiments

[0017] The following description is of exemplary embodiments of the invention only, and is not intended to limit the scope, applicability or configuration of the invention in any way. Rather, the following description is intended to provide a convenient illustration for implementing various embodiments of the invention. As will become apparent, various changes may be made in the function and

arrangement of the elements described in these embodiments without departing from the scope of the invention as set forth herein.

[0018] For example, in the context of the present invention, the method and apparatus hereof may find particular use in connection with electric air fresheners. However, generally speaking, various other devices, having any number of components and features (e.g., battery chargers, timers, audio/visual devices, nightlights, wireless control devices, air filters, computing devices and the like) are suitable for use in accordance with the present invention. In this context, various embodiments of the present invention may be described herein in conjunction with specific devices and it should be appreciated that the scope of the present invention should not be considered limited to those specifically mentioned herein.

[0019] In accordance with the present invention, an electrical device for insertion into an electrical receptacle which is capable of adapting to receptacles of varying sizes and dimensions. Briefly, as used herein "adaptive" refers to the ability to adjust to fit a differently sized or spaced receptacle, and as such, shall be synonymous with "adjustable" and other like meaning terms.

[0020] With reference to Figure 2, an example of a wall-mounted device 200 (such as an air freshener, battery charger or the like) in accordance with the present invention suitably includes a housing **210** and two or more outlet plugs **212** and **214** capable of electrically interfacing with an electrical receptacle having two or more outlets. For example, the non-limiting embodiment shown in Figure 2 is a "duplex" device. Examples of duplex devices, such as a duplex air freshener, are described in U.S. Patent Application Serial No. 10/074,529, entitled "VAPOR-DISPENSING DEVICE," filed February 12, 2002 and U.S. Patent

Application Ser. No. 10/222,501, entitled "METHOD AND APPARATUS FOR DUAL-OUTLET DISPENSER," filed August 16, 2002 the entirety of which are hereby incorporated by reference.

[0021] In the context of a duplex embodiment, each of the two plugs **212** and **214** suitably include two or more outlet prongs (e.g. prongs **202** and **204** for plug **212**, and prongs **206** and **208** for plug **214**) that can be inserted into the holes of a conventional electrical receptacle. In accordance with various electrical standards, one of the prongs **204/208** corresponding to the electrically active or "hot" portion of the electrical receptacle may be slightly larger in size than the other prong **206/210**, which generally corresponds to "neutral" or "ground". Although not shown in Figure 2, a third "ground" prong may also be present on alternate embodiments of each electrical plug **212/214**. Similarly, other configurations (such as for non-standard current or non-U.S. standard plug configurations) likewise fall within the scope of the present invention.

[0022] Because device **200** includes multiple plugs **212/214**, each of which is designed to be inserted into one outlet in a multi-outlet receptacle, each prong **206/208** of one or more of the plugs **214** is configured to adapt or otherwise move, rotate, translate, etc. and/or to accommodate receptacles of varying dimensions. For example, in one embodiment, each prong **206/208** is free to move within the confines of a slot **216** formed in housing **200**. The size of slot **216** suitably corresponds to the extent of movement required by a particular embodiment. For device **200** to accommodate both conventional North American standard and GFCI duplex receptacles, for example, a movement of about 1/8 - 1/4 inch (or about 1-4 millimeters) may be sufficient. Of course the exact amount of

movement needed will vary from embodiment to embodiment, and may be based upon electrical standards, building codes and the like.

[0023] In various embodiments, to adapt, as a user inserts device **200** into an electrical receptacle, the movable prongs **206/208** suitably translate and/or rotate as appropriate to interface with the outlet. For example, in the embodiment shown in Figure 2, prongs **202/204** are inserted into the topmost outlet of the receptacle, and movable prongs 206/208 suitably adjust to the outlet holes of the bottom outlet as device 200 is inserted into the receptacle. Prong placement and insertion may be further aided by designing the length of prongs 206/208 to be shorter than the length of non-movable prongs 202/204, for example, or by shaping movable prongs 206/208 with a beveled, slanted, rounded or similar-shaped edge.

[0024] With reference now to Figure 3A, a device **200** which adapts via rotatable prongs **206/208** is shown. Although prong **208** is not visible in the view shown in Figure 3A, the structures shown for prong **206** could be readily implemented on the other prongs of device **200.** Prong **206** is suitably fashioned with a notch or hole that is capable of accepting a pin **302** or other outcropping so that the pin serves as a pivot point for prong **206**. Pin **302** is any pivot point that is rigidly fixed with respect to housing **210**. In one embodiment, pin **302** is fashioned as an outcropping of housing **210** through appropriate fabrication techniques such as injection molding. Alternatively, pin **302** may be implemented as a separate metal, plastic other object that may be inserted into a groove, hole or other recession in housing **210** such that pin **302** is rigidly held in place. A spring **304** or other elastic member (such as a plastic finger, a rubber band, or any other structure) may be optionally provided to bias prong **206** into a desired initial position or to hold prong **206** in place prior to or after insertion. Spring **304** may

be coupled to any point of prong **206**, and may be attached to housing **210** at any anchor point **306**.

[0025] In this embodiment, prong **206** rotates about pin **302** in response to the position of the outlet receptacle to adapt to the receptacle. For example, as an external force is applied to device 200, prong 206 suitably rotates about pin 302 such that prong 206 is guided within slot 216 to the outlet hole as appropriate. As with the prior embodiments, prong 206 may be shaped in any convenient fashion to assist in guiding prong 206 to the outlet hole.

[0026] With reference now to Figure 3B, another exemplary embodiment of a device 200 suitably includes one or more prongs **206/208** that adapt by translation with respect to housing **210** to accommodate receptacles of varying dimensions. Prong **206** suitably has a front face **320** that interfaces with housing **210** to allow prong **206** to slide or otherwise laterally move within the confines of groove **216**. In a further embodiment, prong **206** includes a tongue, flange or other outcropping that slides within a groove or other guide on housing **210** to guide the lateral movement of prong **206** with respect to housing **210**. As with the prior embodiment, an optional spring **304** or other biasing mechanism may also be provided to bias prong **206** toward an anchor point **306** or other point on housing **210**. Similar to the rotational embodiment described above, in operation, an insertion force provided by the user overcomes the bias force of spring **304** to allow prong **206** to move laterally within groove **216** to interface with the outlet receptacle.

[0027] Figures 3C-D are side and top views, respectively, of an exemplary prong **206/208** that may be used to implement rigid or movable prongs in a device **200**. With reference to Figures 3C-D, an exemplary prong **302** suitably includes two

legs **322** and **324** that receive the prongs of an external appliance such as a hair dryer, lamp, curling iron, kitchen appliance or the like. Prong **206/208** also includes a front face **320** that slides or rotates with respect to housing **210** as described above in conjunction with Figures 3A-B, and may include a hole **332** in any appropriate location to receive spring **304** or another elastic biasing member. As best seen in Figure 3C, prongs **206/208** may be formed such that the portion **336** internal to housing **210** (Figure 2) is not aligned with the external portion **338.** In such embodiments, the non-linear structure of prong **206/208** further enhances rotation, translation or other movement as may be appropriate. Prongs **206/208** may be fashioned from any available material such as metal or plastic. In a further embodiment, prongs **206/208** are made from an electrically-conductive material such as copper, aluminum or the like.

[0028] Figures 4A-B show top and cutaway views of a device which adapts using movable outlet prongs similar to the device illustrated in Figures 3A-D. An exemplary device **200** suitably includes a housing with one or more outlet faces **404/406** capable of receiving the prongs of an electrical plug from an external device (e.g. a radio, hair dryer, curling iron, electric razor, clock, lamp, kitchen appliance, or the like). Outlet faces **404/406** suitably correspond to the two electrical plugs **212/214** disposed within housing **210**, as described more fully below. Housing **200** may be fashioned of thermoformed or injection-molded plastic, metal, ceramic, glass or any other convenient material. Either or both of plugs **212** and **214** may be formed with the exemplary structures shown in Figures 4A-B, or with any other plug structure.

[0029] With reference to Figures 4A-B, housing **210** of device **200** suitably includes a front face **402** and a back face **404** encompassing plugs **212/214**, as

well as the various components applicable to the type of device the present invention is embodied in. Each plug **212/214** includes a set of prongs **202/204**, **206/208** that interface with the prongs of an external device. In the stationary prong structure shown in Figure 4A, each prong **202/204** is formed to include legs **320/322** as described above to electrically connect the prongs of the external device with one of the outlets in the receptacle. Prongs **202/204** may be formed such that front face **320** of each prong is rigidly held in place within the back face **404** to prevent movement of the prongs with respect to housing **210**. In the movable structure shown in Figure 4B, the prongs of an external device are guided and held in place by legs **322** and **324**, which may be physically isolated from the external sliding portion **334** (Figure 3C). A gap **410** may be provided such that prongs **206/208** are allowed to translate along front face **320**, as guided by slot **216** (Figure 2). Alternatively, a rotational, translational or other structure such as those described above could be used.

[0030] For the sake of brevity, conventional electrical and mechanical design techniques used in developing various multiplexing devices (and the various components thereof) are not described in detail herein. Accordingly, devices disclosed herein may be readily modified to create equivalent embodiments through application of general electrical and mechanical principles. In a still further embodiment, the uppermost set of prongs may be configured to adjust to variations in receptacle size in addition to or in place of the lowermost prongs, as shown in the Figures herein. Moreover, although the general concepts of self-adjustability have been described with reference to a vapor dispensing device herein, these concepts may be readily applied to other equivalent electrical devices

such as air filters, nightlights, audio speakers, wireless control devices, timers and the like.

[0031] The particular implementations shown and described herein are examples of the invention and are not intended to otherwise limit the scope of the invention in any way. In this context, the corresponding structures, materials, acts and equivalents of all elements described herein, are intended to include any structure, material or acts for performing the functions described herein and include those now known or hereafter devised.